

COMPLETE SET OF PENDING CLAIMS

1. (Currently Amended) A method for cleaning a flat media workpiece comprising the steps of:

forming a boundary layer of a heated liquid on the workpiece, with the liquid heated to about 25-200°C;

providing ozone into the environment around the workpiece; and

directing a liquid jet at the workpiece, with the liquid jet moving at a speed sufficient to penetrate through the boundary layer and to physically dislodge a contaminant on the workpiece.

2. (Previously Presented) The method of claim 1 where the liquid jet comprises water.

3. (Previously Presented) The method of claim 1 where the liquid jet is pressurized to about 100-15,000psi.

4. (Previously Presented) The method of claim 1 where the liquid jet is pressurized to about 400-800psi.

5. (Currently Amended) The method of claim 1 further comprising the step of heating the liquid jet to 25 [65]-99 degrees C.

6. (Original) The method of claim 1 where the ozone is provided as a dry gas into the environment around the workpiece.

7. (Previously Presented) The method of claim 1 where the ozone is provided into the environment around the workpiece by introducing ozone into the liquid used to form the liquid jet.

8. (Original) The method of claim 1 further comprising the step of spinning the workpiece to help form the boundary layer

9. (Original) The method of claim 2 where the liquid further comprises a member selected from the group consisting of hydrofluoric acid, hydrochloric acid, ammonium hydroxide, and hydrogen peroxide.

10. (Original) The method of claim 1 where the liquid comprises a member selected from the group consisting of sulfuric acid, phosphoric acid, and halogenated hydrocarbons.

11. (Cancelled).

12. (Currently Amended) The method of claim ~~11~~ wherein the ~~electromagnetic energy comprises a member selected from the group consisting of 1~~ further comprising the step of irradiating the workpiece with electromagnetic energy including at least one of ultraviolet, infrared, microwave, gamma or x-ray radiation.

13. (Previously Presented) The method of claim 1 further comprising the step of moving the liquid jet relative to the workpiece, so that substantially all areas of the workpiece surface facing the jet are exposed at least momentarily to the jet.

14. (Currently Amended) The method of claim 1 where the liquid jet is substantially perpendicular to the workpiece.

15. (Cancelled).

16. (Cancelled).

17. (Previously Presented) The method of claim 13 further including the step of moving the liquid jet on a swing arm within the chamber.

18. (Cancelled).

19. (Cancelled).

20. (Currently Amended) The method of claim 1 further comprising 18 ~~where the sonic energy is introduced to the workpiece by~~ introducing sonic energy into a nozzle forming the liquid jet.

21. (Cancelled).

22. (Previously Presented) The method of claim 1 where the liquid jet has a diameter of from about .5-10 mm.

23. (Previously Presented) The method of claim 1 where the workpiece has a top surface and a bottom surface, and where the liquid jet is directed from below against the bottom surface.

24. (Original) The method of claim 13 where the relative movement occurs at a rate of from about .5 – 500 linear mm per second.

25. (Currently Amended) A method for ~~cleaning a flat~~ removing an organic contaminant from a workpiece comprising in any sequence the steps of:

heating a liquid ~~to about 25-99°C;~~

providing [a] the heated liquid onto a surface of the workpiece;

spinning the workpiece to form the heated liquid into a ~~boundary~~ layer;

moving a high pressure liquid jet across the surface of the workpiece, with the jet penetrating through the ~~boundary~~ layer and impacting against the surface of the workpiece, to physically remove a contaminant from the surface; and

providing ozone around the workpiece, with the ozone diffusing through the ~~liquid boundary-layer~~ and chemically reacting with the contaminant at the workpiece surface, and with the chemical reaction between the ozone and the contaminant helping to remove the contaminant from the workpiece.

26. (Original) The method of claim 25 where the ozone is provided by placing the workpiece into a chamber and supplying ozone gas into the chamber.

27. (Previously Presented) The method of claim 25 where the ozone is provided by supplying ozone into the liquid forming the liquid jet.

28. (Original) The method of claim 25 further comprising heating the workpiece.

29. (Previously Presented) The method of claim 28 where the heating is performed by heating the liquid jet.

30. (Original) The method of claim 28 where the heating is performed by introducing steam to the workpiece.

31-34. (Cancelled)

35. (Currently Amended) A method for cleaning a flat media workpiece comprising in any sequence the steps of:

, with the liquid at about 25-200°C;

forming a ~~boundary~~ layer of ~~a heated~~ liquid on the workpiece, with the liquid at about 25-200°C;

providing ozone into the environment around the workpiece, with the ozone diffusing through the ~~boundary~~ layer and chemically reacting at the surface of the workpiece; and

directing a jet of steam through the ~~boundary~~ layer to physically dislodge a contaminant on the workpiece.

36. (Cancelled).

37. (Currently Amended) The method of claim 1 where the ~~boundary~~ layer of heated liquid is formed from condensed steam ~~the liquid jet~~.

38. (Cancelled)

39. (Previously Presented) The method of claim 1 wherein the liquid jet is at an oblique angle to the workpiece.

40. (Cancelled).

41. (Currently Amended) The method of claim [40] 1 wherein the heated liquid is at a temperature in the range of [85-105] about 40-97° C.

42. (New) A method for processing one or more workpieces, comprising the following steps performed in any sequence:

heating a liquid;

forming the liquid into at least one moving column of heated liquid;

entraining ozone gas into the column of heated liquid;

directing the column of liquid towards the workpiece, with the column of liquid impacting on the workpiece, to physically remove one or more contaminants from the workpiece, and with the entrained ozone gas in the column of liquid contacting the contaminant and chemically reacting with the contaminant.

43. (New) The method of claim 42 further comprising in any sequence, the step of forming a layer of heated liquid on the workpiece.

44. (New) The method of claim 43 further comprising introducing ozone gas around the workpiece and with at least some ozone gas diffusing through the layer of

heated liquid and chemically reacting with a contaminant on the surface of the workpiece.

45. (New) The method of claim 42 with the column of liquid having a diameter, and with the diameter ranging from about 0.5mm to 10mm.

46. (New) A method for cleaning one or more workpieces, in any sequence, comprising:

step for providing a layer of heated liquid on the workpiece, with the liquid heated to about 25-200°C;

step for controlling or maintaining the thickness of the layer of heated liquid;

step for removing a contaminant from the workpiece via physical impact of liquid against the workpiece;

step for chemically reacting ozone with a contaminant on the workpiece.

47. (New) The method of claim 46 further comprising step for removing a contaminant from the workpiece by chemical reaction with diffused ozone and with entrained ozone.

48. (New) The method of claim 46 with the liquid heated to about 40-97°C.

49. (New) A method for cleaning a workpiece, comprising in any sequence the steps of:

directing a jet of steam towards the workpiece;

directing a flow of ozone to the workpiece, separately or mixed with the jet
of steam;

forming a layer of liquid on the workpiece;

physically removing contaminants from the workpiece via impact of the jet
of steam; and

oxidizing and removing contaminants on the workpiece via chemical
reaction of the ozone.